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31 October 1952

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MEMORANDUM FOR: CHIEF, FAR EAST

VIA: FE/Cleddinning

SUBJECT: Staybehind Burials

REFERENCE: Memorandum for Chief, OTS, Mechanical Branch,  
from Chief, Far East, subject "Staybehind Burials,"  
dated 19 September 1952.

1. Receipt of the referenced memorandum is acknowledged. No records of previous long-term burials have been discovered in this office's search for information on the subject. The only information available is the result of attempted accelerated burial tests performed by MB/TSS. Development of packaging for underground burial (RDP-39) has been aimed at 2 to 5-year burial. For any burial it is strongly recommended that periodic inspections be made, where possible, to determine the stage of preservation of the various items. This should be performed although the estimated burial life of an item is termed indefinite.

2. The reference memorandum requested lists of necessary equipment and material, brief explanation of the process, and evaluation of the hot-dip method, stainless steel or rigid container, nylon/foil or linen/foil wrap, and conventional automobile undercoating process.

a. Hot-Dip Method:

(1) Necessary equipment

- (a) Barrier material plain aluminum foil JAN-B-148, Type 1
- (b) Cellulose-acetate-butyrate formulation Type II, JAN-C-149
- (c) Tank suitable for applying strippable protective coating. Tanks available from the D. C. Cooper Company, Chicago, Illinois.
- (d) Equipment to suitably clean and add preservative to material prior to packaging.

b. Process:

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**(2) Process:**

The object is first thoroughly cleaned and a preservative added. Aluminum foil is conform wrapped around the object. After this preparation the object is dipped in a hot liquid plastic, cellulose-acetate-butyrate, that has been heated to a temperature between 325° F and 350° F. Usually the double dip method described under Method 1B in JAN-P-116, is employed. After the hot plastic has hardened around the object, all possible sources of leaks, such as where the plastic overlaps as a result of double dipping, are smoothed over with the use of a hot iron.

**(3) Evaluation of Process:**

Due to the high application temperatures of the plastic, the hot-dip method should not be used for items of an incendiary or explosive nature. As the plastic is not a perfect moisture vapor barrier, the hot-dip method is not recommended for items having a great number of large irregularities or void spaces containing compounds sensitive to moisture. This method finds its greatest application with relatively smooth metal objects such as revolvers, machine guns, rifles, cigarette lighters, blasting machines, tools, and spare parts. The main advantage of the hot-dip method is that the resulting plastic coat is permanent and rugged.

**b. Stainless Steel or Aluminum Rigid Container:**

**(1) Necessary equipment:**

- (a) Stainless steel or aluminum container
- (b) Barrier material, moisture-vaporproof, flexible, cloth-backed aluminum foil, class 1, MIL-B-131B; or nylon-backed special barrier material.
- (c) Heat sealing equipment for barrier material.
- (d) Non-hygroscopic cushioning material.

**(2) Process:**

All items that are susceptible to moisture vapor and are not suitably packaged in a moisture vapor barrier are heat-sealed inside a barrier material in accordance with the applicable sections of Appendix VI, Method II, of JAN-P-116. Desiccant is added when applicable. Items to be buried are then placed inside the rigid container and suitably cushioned

using non-hygroscopic

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using non-hygroscopic cushioning material. This cushioning is carefully designed for each specific combination of contents. The container is then closed. For shipping purposes one or more containers are then placed in nailed wooden boxes in accordance with JAN-P-106A.

(3) Evaluation of Process:

This process employs specially designed and constructed containers. The CIA container is presently in prototype stage. Inside dimensions of prototype container are 7 x 9 x 16-1/2"; therefore the container cannot be used for burial of larger items. The empty container is to weigh approximately 5 pounds. MB/TSS prefers a stainless steel container for corrosion resistance. No positive derogatory information is available on aluminum containers for burial; however, metallurgists consulted contend that stainless steel should be decidedly more satisfactory for burial. Chief difficulty of rigid containers is developing and producing a closure that will give the container a positive hermetic seal. MB/TSS feels that the practical approach to the seal problem is to develop a watertight container that has an hermetic seal for the majority of containers. Following this assumption, all items stored inside the container that are susceptible to damage by moisture vapor should be additionally packaged by being heat sealed in moisture-vaporproof barrier material. This packaging should not present a major problem as most items as produced are individually sealed in moisture-vaporproof containers.

c. Nylon/foil or linen/foil Wrap Method:

(1) Necessary equipment:

- (a) Barrier material, moisture-vaporproof, flexible, class 1, MIL-B-131B, or nylon-backed special barrier material.
- (b) Heat sealing machine for barrier material, such as type 1, size 6 (portable weighing 3-1/2 pounds), in Specification MIL-S-4461.
- (c) Desiccant, grade A or B, under Specification JAN-D-169.
- (d) Cellulosic cushioning material, in accordance with Federal Specification UU-C-843.

(e) Greaseproof

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(e) Greaseproof barrier material, grade A, type I, class I, Specification JAN-B-121.

(f) Equipment to suitably clean and apply preservative prior to packaging.

(2) Process:

When applicable, the object is first thoroughly cleaned and a preservative added. The object is wrapped as tightly as possible in Grade A greaseproof barrier material. Except for items such as propellant powder in which the moisture content as produced must be maintained, desiccant is added to the package, the amount depending on the size of the package. For highly corrosive metals such as gun barrels, the desiccant should be placed outside the Grade A greaseproof barrier material; in all other cases the desiccant shall be placed next to the object. All sharp edges shall be padded with cellulosic cushioning material. The object is then carefully heat sealed inside a moisture vaporproof barrier material. Items packaged according to the above shall be snugly stored in nailed wooden cases employing no liner. Experience has proven that liners may become punctured, resulting in pooling of water inside the liners.

(3) Evaluation of Process:

The above foil wrapped method has the advantage that it can be used to package any size or shaped object, and safely package explosives and incendiaries. Burial tests have proven that the cloth backing on class I, MIL-B-131B, aluminum foil barrier material is susceptible to bacterial decay. In addition this MIL-B-131B barrier material has a low moisture vapor transmission, the effect of which desiccant is calculated to be overcome during normal storage conditions. Where exceptionally long caching is contemplated, even a low moisture vapor transmission should be avoided is possible. MIL-B-131B barrier material may become damaged during rough handling. The above disadvantages of MIL-B-131B barrier material (decay during burial, low moisture-vapor transmission, and possible damage during rough handling) are the factors which caused MB/TSS to develop a special nylon-backed special barrier material. This heat-sealable material has two layers of foil and two layers of fiberthin nylon backing. Tests have shown that the nylon-backed special barrier material has a moisture vapor transmission below the accuracy of present test measurements. The backing of this material has negligible decay during burial, and the material is capable of normal

rough handling.

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rough handling. Specifications and drawings for the special nylon-backed barrier material are being prepared. They will then be turned over to the Procurement Office.

Where desired, items packaged in cloth-backed foil barrier material can be placed inside a sealed neoprene-nylon bag. The purpose of this bag is to provide a light outer container to facilitate carrying before and after burial. The bag also offers additional protection during burial.

d. Automobile Undercoating Process:

This process has been unsuccessfully tested by various organizations for burial. The undercoating supports organic growth and is not recommended for burial.

e. Other Methods Available:

The Office of Communications, CIA, has developed a waterproof container, type EC-2, which is a heavy gauge steel container that is hot-dip galvanized with a very heavy coating of zinc. The EC-2 container has dimensions of 2-11/16 x 8-15/16 x 10-1/4 inches. Also being developed are containers EC-3 through EC-6 having the following dimensions:

EC-3	5 x 12 x 12 inches
EC-4	9 x 12 x 15 inches
EC-5	4 x 8 x 21 inches
EC-6	5 x 10 x 15 inches

The instruction book for the EC-2 waterproof containers states that it may be expected to fully protect its contents for a period of two years under extreme conditions. Under average conditions, five years protection may be expected; while up to 13 years protection may be expected under the very best soil conditions. Longer life expectancy can be obtained by additional cathodic protection by attaching zinc bars. The above containers have the disadvantages of relatively heavy weight for size of container (7.5 pounds for the EC-2) and not being too easily opened and closed.

3. The referenced memorandum also requested the "shelf-life," or the estimated life under burial conditions (whichever applicable) of those items listed in its Attachment A. The assumption is made that the equipment is properly packaged for burial and that it can reasonably be expected to remain fully usable for the period estimated. To obtain this information the Mechanical Branch/TSS consulted the Applied Physics Branch/TSS, Chemical Branch/TSS, and Office of Communications for applicable items. The following estimates are a result of these consultations:

Items

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<u>Items</u>	<u>Expected Burial Life</u>
<u>Rescue Equipment</u>	
1. Aerial snatch equipment	(a)
2. Folboat, rubberized canvas overframe w/oars, sail and other operating equipment	10 years
3. Standard armed services collapsible rubber boat, w/necessary operating equipment	5 to 10 years
4. Flares, military-railroad	5 years
5. Very pistol w/charge	5 years
6. Signaling mirror	Indefinite
7. Lensatic compass	Indefinite
8. Cloth waterproof maps	Indefinite (b)
9. Paper maps-standard AMS	Indefinite (b)
10. Flashlight w/batteries	Indefinite (c)
11. Binoculars, 6 x 30, 7 x 50	Indefinite (d)
12. Wrist watch, pocket watch (Ingersol type, quality type)	(dry) Indefinite (e)
<u>Medical Supplies</u>	
1. Sulfadiazine tablets	Indefinite
2. Bandages, adhesive tape	Indefinite
3. APC tablets	Indefinite
4. Procaine penicillin in oil	Indefinite
5. Amphojel tablet	Indefinite
6. Morphine syrettes	Indefinite
7. Multivitamine tablets	Indefinite
8. Water	

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Items (Medical Supplies)Expected  
Burial Life

8. Water purification tablets (iodine)	3 years
9. Insect repellent	3 years
10. Iodine or methiolate	Indefinite
11. Caster oil	Indefinite
12. Benzedrine, dexedrine	Indefinite

Food

1. Assault rations	30 months
2. "C" rations	30 months
3. Uncooked, dry rice	30 months
4. Chocolate	18 months
5. Canned meats (spam)/fish	3-1/2 years
6. Canned vegetables	3-1/2 years
7. Cigarettes	2 years
8. Beer	2 years
Whiskey, gin	Indefinite
9. Penicillin	18 months

Communications Equipment

1. Throw-away radio receiver	Indefinite (c)
2. ER-1 agent radio receiver/trans	3 years (f)
3. RS-6 burial radio receiver/trans	10 years (f)
4. "Dog" channel air/sea rescue voice receiver/trans	(g)
5. SCR/300 receiver/trans	(h)

Weapons and Demolition Equipment

1. Revolver	Indefinite
2. Semi-automatic pistol	Indefinite
3. Sub-machine	

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Items (Weapons and Demolition Equipment)	<u>Expected Burial Life</u>
3. Sub-machine gun	Indefinite
4. Rifle	Indefinite
5. Automatic rifle or machine gun	Indefinite
6. Grenades Incendiaries	20 years
	5 years
7. C-3, C-4 plastic	10 years
8. TNT	25 years
9. "Primacord" detonating cord	12 years
10. Fuze (time)	20 years (1)
11. Non-electric engineer caps	10 years
12. Electric cap	10 years
13. 10 cap blasting machine w/wire	20 years
14. Special pull, push firing devices	Indefinite

Barter Items

1. Wrist watch	5 years
2. Costume jewelry	Indefinite (j)
3. Fountain pens Automatic pencils	10 years
	Indefinite
4. Cigarette lighters Zippo/Ronson	Indefinite

Clothing

1. Cotton clothing/Japanese quality	10 years
2. Army issue HBT fatigues	10 years
3. Woolen clothing	10 years
4. Leather clothing	5 years
5. Nylon, orlon and other synthetic fabrics	5 years

(a) Equipment

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- (a) Equipment in design stage and cannot be evaluated.
- (b) Mildew proofing is recommended.
- (c) Use special batteries packed dry. Fill with electrolyte from sealed glass ampules just before use. Only this type should be buried; most batteries gas and corrode under good shelf conditions. Gases may be corrosive to other contents in burial container.
- (d) If lenses, etc., are not glued. Make to be buried should be evaluated.
- (e) Watch should be buried dry and lubricated after removal. Watch well lubricated will get gummy after 5 years.
- (f) Use hand generator.
- (g) Not sufficient description.
- (h) Obsolete; not reliable.
- (i) keep out of extreme heat.
- (j) If not held together with glue.

4. Relative to the above list, each individual item should be carefully studied to determine the exact details and method of packaging to be used.

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Chief  
Mechanical Branch  
Research & Development

**Distribution:**

Addressee - Orig.

TSS - 1

AJEdwards - 1

MB - 1 (Burial, Underground, Packaging for) ✓

MB Chrono.

HJV/agw

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